10111336-00

MASTER
DO NOT SHIP

AR-250PCM

PCM AMP UNIT

INSTRUCTIONS
◆
SERVICE MANUAL

TEAC CORPORATION. JAPAN

Table of Contents

1. PREFACE 1
2. FEATURES 1
3. BLOCK DIAGRAM 2
4. INSTALLATION AND OPERATION 3
   4-1 When installing an AR-250PCM unit for the first time 3
   4-2 For an additional installation of an AR-250PCM 3
      4-2-2 Replacing the AMP unit
      4-2-3 Operation checks
   4-3 Operation 9
      4-3-1 MANUAL setting
      4-3-2 PCM bar graph display
      4-3-3 Waveform display
   4-4 Digital output 11
5. SPECIFICATIONS 12
6. INPUT/OUTPUT CONNECTIONS 13
7. NOTES AND OTHER MATTERS 14
8. ADJUSTING THE AR-250PCM 15
   8-1 Adjusting the bias and recording current 16
   8-2 Adjusting the input amplifier 16
   8-3 Adjusting the ADC (A/C converter) 16
   8-4 PCM AMP MAIN PCBA - Adjustment locations - 18
   8-5 PCM AMP MAIN PCBA and Parts list 19
   8-6 PCM AMP MAIN - Schematic diagram - 1 to 4 ..... 26 to 29
   8-7 PCM AMP SUB PCBA and Parts list 30
   8-8 PCM AMP SUB - Schematic diagram - 1 to 2 ..... 32 to 33
   Parts ordering informations

1. PREFACE

The AR-250PCM is an optional built-in multi-recording/reproduction PCM AMP cardboard unit to be used for an XR-5000/7000 cassette data recorder. PCM recording/reproduction can be made using only one card.

Because the AR-250PCM employs a PCM (pulse code modulation) system, up to eight channels of analog multiplex signals can be recorded on one track.

The advantages of this system are:

* Better S/N ratio compared with units employing an FM AMP unit
* Less S/N variation due to tape speed changes
* Less drifting effect

2. FEATURES

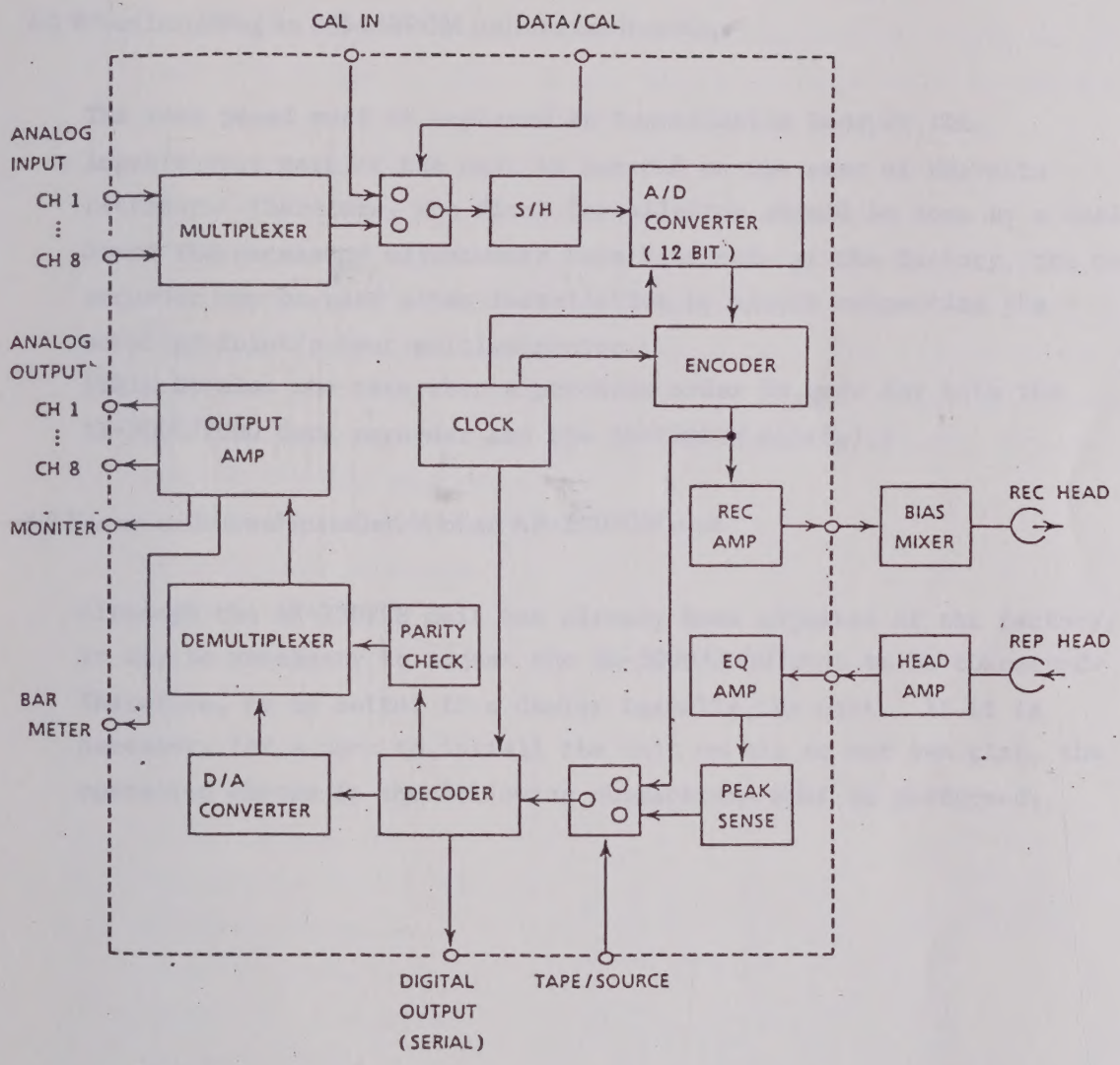
(1) The AR-250PCM AMP units can be replaced with the standard FM AMP units normally mounted on an XR-5000/7000 series data recorder.

(2) All the tracks using the FM AMP units can be replaced by AR-250PCM units so that multichannel recording/reproduction can be made.

(3) The number of multiplex channels on a track (1, 2, 4, or 8) can be displayed and, if necessary, switched simply.
The unit automatically selects the appropriate sampling frequency according to the number of multiplex channels.

(4) In addition to digital output, the unit is equipped with eight channels of analog output for analog signal processing.

3. BLOCK DIAGRAM



4. INSTALLATION AND OPERATION

4-1 When installing an AR-250PCM unit for the first time

The rear panel must be replaced at installation because the input/output part of the unit is located on the rear of the data recorder. Therefore, the first installation should be done by a dealer. Since the necessary adjustments have been made at the factory, the data recorder can be used after installation by simply connecting the supplied input/output multiconnector.
(This is also the case when a purchase order is made for both the XR-5000/7000 data recorder and the AR-250PCM unit(s).)

4-2 For an additional installation of an AR-250PCM unit

Although the AR-250PCM unit has already been adjusted at the factory, it may be necessary to adjust the XR-5000/7000 unit to be connected. Therefore, it is better if a dealer installs the unit. If it is necessary for a user to install the unit on his or her own risk, the operation checks in the following subsections must be performed.

4-2-1 Replacing the AMP unit

Before starting to replace the unit, check that the power switch on the unit is set to OFF. If so, remove the rear panel by pulling back the left and right side stoppers at the rear of the unit.
Pull back the card pullers of the AMP unit corresponding to the channel you are going to replace and then pull the card out.
For installation, place down the card puller of the PCM AMP unit you are going to install and then gently insert the card along the upper and lower rails until the edge of the card puller reaches the end position. Place the edge in the groove at the end position and then move the card puller up as a lever so that the AMP unit is inserted in the connector.
Push the edge of the AMP unit forward to firmly connect it to the connector.
(See Fig. 1.)
After installing the card, remove the blind cover corresponding to the channel of the PCM AMP unit installed, located on the rear panel, and then close the rear panel.
To complete the board installation, fix the PCM AMP unit to the rear panel using the supplied fixing screws.

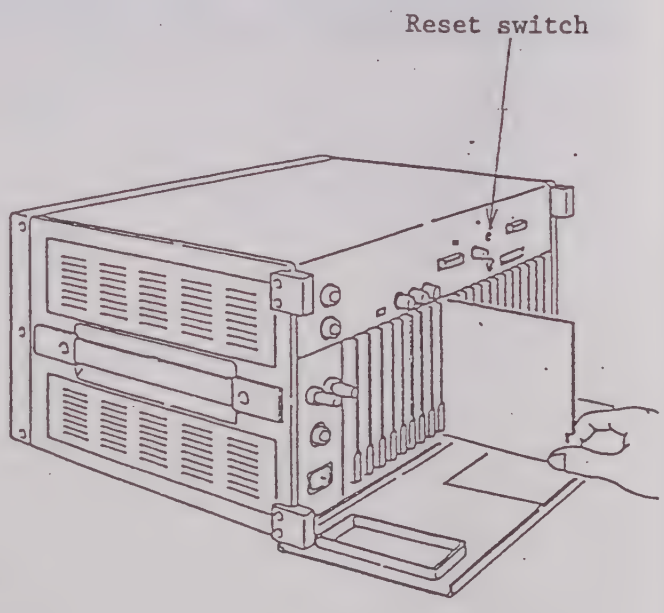


Fig. 1

4-2-2 Operation checks

Ckeck the PARAMETERS display:
Turn on the data recorder and then press the reset switch at the rear. Check the PARAMETERS display to see if the display for the channel of the replaced unit has changed from FM to PC and the INPUT has been set to MPX1/1.(This changed channel will be referred to as PC-CH hereafter.)

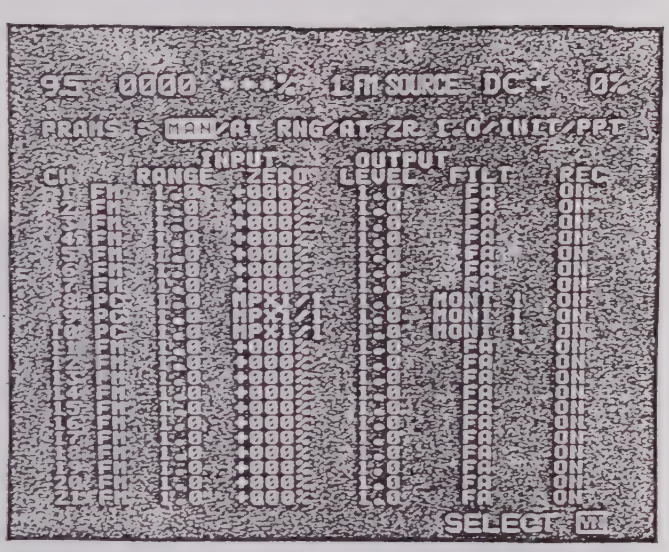


Photo 1 PARAMETERS display (when PCM units are installed in channels 8, 9 and 10.)

Checking with the SELF TEST function:

Load a tape suitable for recording on the data recorder. Set the SYSTEM and the PARAMETERS as follows:

ERASE: ON

PC-CH: REC ON

Then press the following panel keys in the order shown below.

[MISC] ——→ [Y/N] ——→ [Y/N]

(Displays MISC.) (Displays SELF TEST.) (TEST starts.)

----- The SELF TEST finishes after about one minute, and the results are displayed.

OK must be displayed for each PC-CH.

After completion of the SELF TEST, set the display back to the PARAMETERS display as follows:

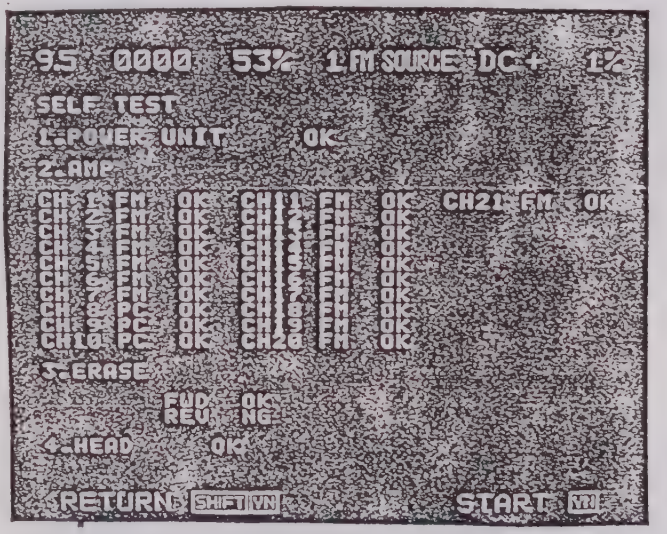


Photo 2 Results of SELF TEST

[SHIFT] [Y/N] (Press both at the same time.)

(Display MISC.)

↓

[PARAMETERS]

(Displays PARAMETER.)

Checking with the bar graph:

Set the MONITOR to PC-CH using the MONITOR CH [▲] and [▼] keys. (Photo 3 shows an example of the display when channel 10 is selected.)

Press the [SYSTEM] key for the SYSTEM setting display. Set 0/1 for the CAL SW MODE using the ENTRY key. Press the [Y/N] key and then the [PARAMETERS] key to set the display back for the PARAMETER setting display.

Press the [Y/N] key for the MANUAL setting display. Move the coursor to the MPX1/1 using the [▶] key and then to the MPX8/8 using the [SHIFT] and [▼] keys. Press [SHIFT] and [Y/N] keys to set the display back to the PARAMETER display.

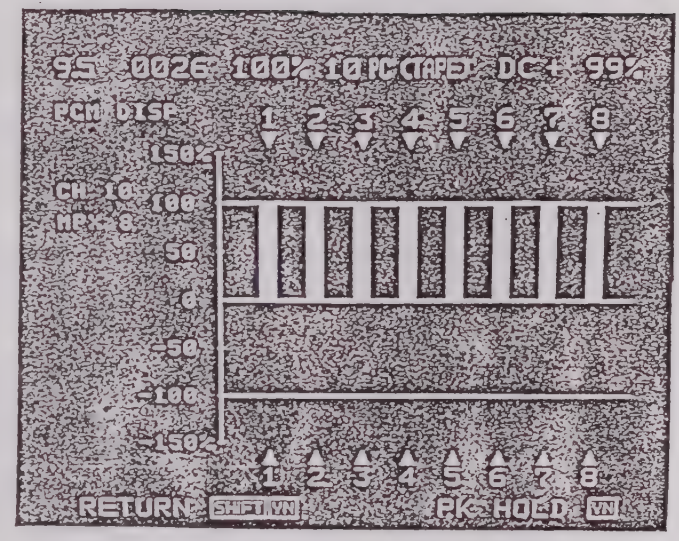


Photo 3 PCM bar graph (for CAL DC +100% input)

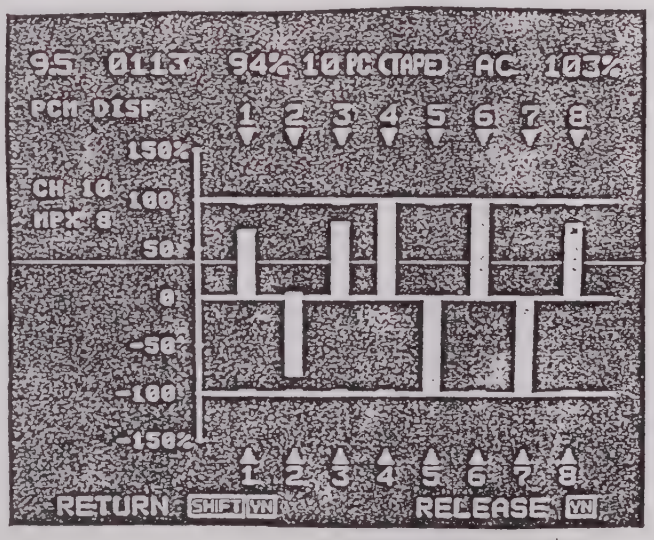


Photo 4

Press the [DISPLAY] key, then the [SHIFT] and [Y/N] keys for the PCM DISP display. Press the [REC] and [FWD] keys to start recording. Then press the CAL [DC+100%] key and check that the displays for the channels 1 to 8 are close to +100% as shown in Photo 3. Press the CAL [DC-100%] key and check that the displays for channels 1 to 8 are close to -100%. After completing the DC check, press the CAL [AC100%] key, then the [Y/N] key and the MONITOR [AC/DC] key. The bar graph will change, and the check will be complete after 10 to 20 seconds, when the PEAK level becomes about ±100% as shown in Photo 4 and the digital voltmeter reads 100 VAC ±10%.

Press the reset switch at the rear of the unit to set the display back to the initial display. If there is no problem during the check, the data recorder can be used. If, for some reason, the check is not complete, contact TEAC.

4-3 Operation

4-3-1 MANUAL setting

To set the display to the MANUAL setting display, press the [Y/N] key while the PARAMETERS screen is displayed. On the MANUAL setting display, you may set the number of multiplex channels (how many channels are to be used in a PCM channel) and the MONITOR channels (the channels to be output to the BNC of the monitor, digital voltmeter, and waveform display).

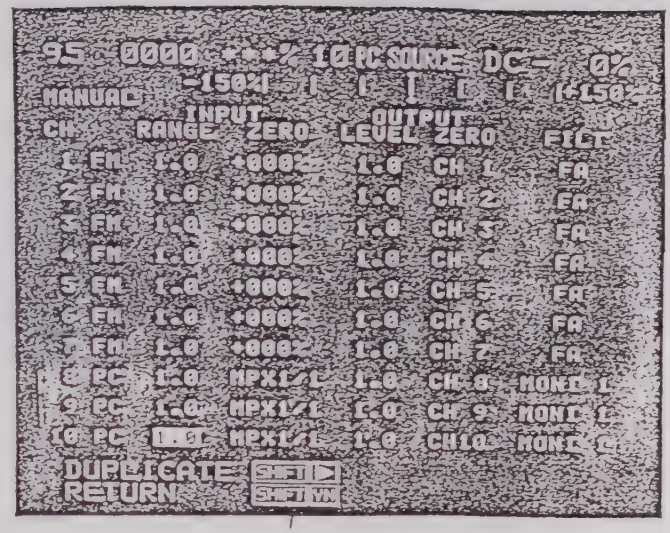


Photo 5 MANUAL setting display

To make a change, move the cursor to the desired position using the [◀], [▶], [▲], and [▼] keys. Setting the MONITOR to PC-CH and then pressing the [Y/N] key causes the cursor to move to the RANGE [1.0] of the PC-CH as shown in Photo 5.

- Setting the number of the MPX channels
  Move the cursor to the MPX1/1 position and set the desired numbers using the [SHIFT] and [▲] or [SHIFT] and [▼] keys.

- Setting the MONI CH
  Move the cursor to the MONI [1] using the [▶] key, and then set the desired channel (the CH in the PCM unit) using the [SHIFT] and [▲] or [SHIFT] and [▼] keys.

4-3-2 PCM bar graph display

To display the PCM bar graph, first set the MONITOR to PC-CH, then press the [DISPLAY] key and the [SHIFT] and [Y/N] keys.
To display the bar graph of all channels, press the [SHIFT] and [Y/N] keys.

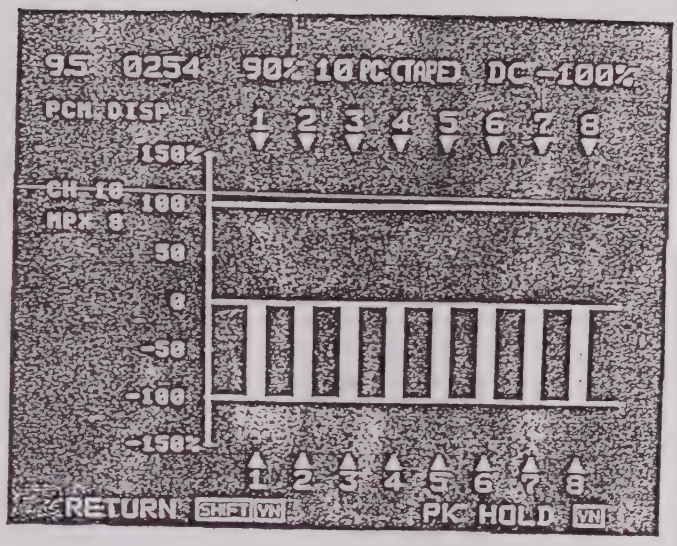


Photo 6 Bar graph display (when CAL -100% is displayed)

4-3-3 Waveform display

To display the waveform, press the [SHIFT] and [▶] keys while the DISP screen is displayed.
To display the bar graph of all channels, press the [SHIFT] and [▶] keys.

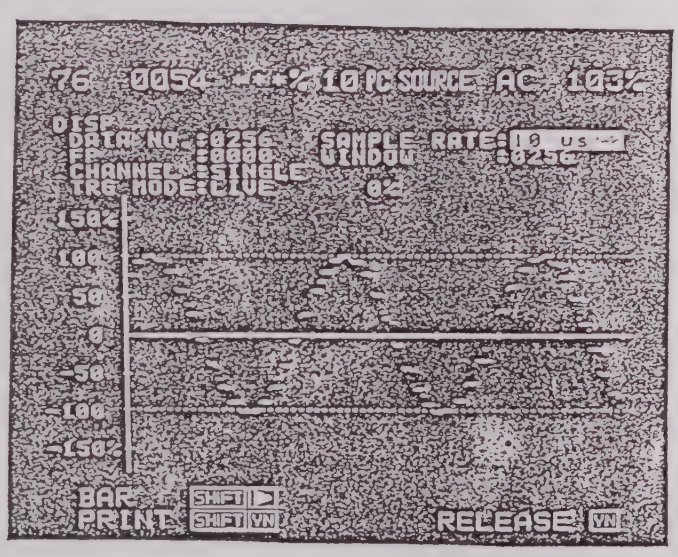
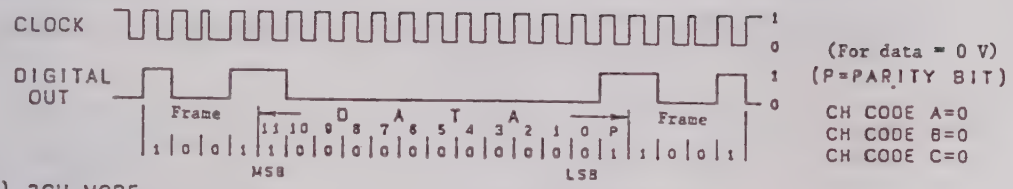


Photo 7 Waveform display (The waveform is not continuous because the output signal passes through no low-pass filters.)

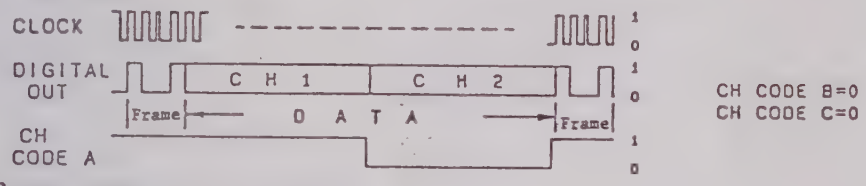
See the instruction manual supplied with the data recorder for details of recording, reproduction, waveform display and operations.

4-4 Digital output

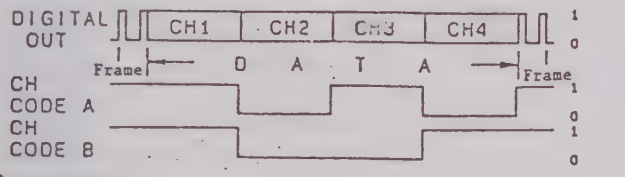
(1) 1CH MODE



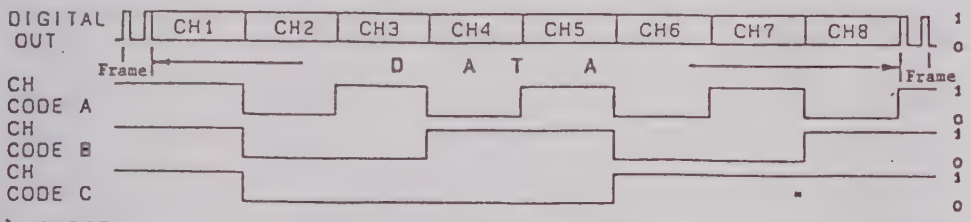
(2) 2CH MODE



(3) 4CH MODE



(4) 8CH MODE



(5) ERROR

a. If a frame is not detected, the error bit is set to 1.
When a normal frame is detected, the error bit is reset to 0.

b. If a parity error is detected, the error bit is set to 1.
If the parity of the next data is normal, the error bit is reset to 0.

5. SPECIFICATIONS

Recording/reproducing system	PCM recording/reproducing system
Tapes which can be used	EIAJ 12.7 mm wide VHS cassettetape (MAXELL T-120HGX)
Input impedance	100 kilohms (unbalanced)
Input voltage	±1 V (Max. ±2 V)
Output impedance	75 ohms (unbalanced)
Output voltage	±1 V (Max. ±2 V)
PCM format	Conforms to DIN standard 66224 D3.1

Bit rate, sampling frequency

Tape Speed (cm/sec)	Bit rate (bit/sec)	Sampling frequency (Hz)			
		1 CH	2 CH	4 CH	8 CH
76.2	320 K	18.8 K	10.66 K	5.71 K	2.96 K
38.1	160 K	9.41 K	5.33 K	2.85 K	1.48 K
19.05	80 K	4.70 K	2.66 K	1.42 K	740
9.52	40 K	2.35 K	1.33 K	714	370
4.76	20 K	1.17 K	666	357	185
2.38	10 K	558	333	178	92
1.19	5 K	249	166	89	46

S/N	60 dB (Maximum input level)
Crosstalk	Below the noise level of each channel
Linearity	±0.25%
Drift	±0.25% or less, through the whole of one tape after 15 minutes of running time.
Digital output	Bit serial/channel serial Clock Channel code
Temperature/relative humidity	0° to 40°C/20% to 80% (no condensation)

Input cable Ass'y 1592285B-00

Output cable Ass'y 1592859-00

6. INPUT/OUTPUT CONNECTORS

Input: 20-pin multiconnector

Plug at the board	FCN-235P020-G/E	Fujitsu, Ltd.
Socket at the cable	FCN-231J020-G/E	Fujitsu, Ltd.
Metal cover	FCN-230C020-A/E	Fujitsu, Ltd.

Pin assignment

1 pin	CH1 IN	11 pins	CH5 IN
2 pins	CH1 GND	12 pins	CH5 GND
3 pins	CH2 IN	13 pins	CH6 IN
4 pins	CH2 GND	14 pins	CH6 GND
5 pins	NC	15 pins	NC
6 pins	NC	16 pins	NC
7 pins	CH3 IN	17 pins	CH7 IN
8 pins	CH3 GND	18 pins	CH7 GND
9 pins	CH4 IN	19 pins	CH8 IN
10 pins	CH4 GND	20 pins	CH8 GND

Output part: 28-pin multiconnector

Plug at the board	FCN-235P028-G/E	Fujitsu, Ltd.
Socket at the cable	FCN-231J028-G/E	Fujitsu, Ltd.
Metal cover	FCN-230C028-A/E	Fujitsu, Ltd.

Pin assignment

1 pin	CH1 GND	15 pins	CH5 OUT
2 pins	CH2 GND	16 pins	CH6 OUT
3 pins	CH1 OUT	17 pins	CH5 GNC
4 pins	CH2 OUT	18 pins	CH6 GND
5 pins	CH3 OUT	19 pins	CH7 OUT
6 pins	CH4 OUT	20 pins	CH8 OUT
7 pins	NC	21 pins	CH7 GND
8 pins	CH4 GND	22 pins	CH8 GND
9 pins	CH3 GND	23 pins	GND
10 pins	CH CODEA	24 pins	GND
11 pins	GND	25 pins	NC
12 pins	CH CODEB	26 pins	CLOCK
13 pins	GND	27 pins	ERROR
14 pins	CH CODEC	28 pins	DIGITAL OUT

7. NOTES AND OTHER MATTERS

(1) For your reference, the table below shows the frequency characteristics when sampled at a rate of five points per period.

Tape speed (cm/sec)	Frequency characteristics (Hz)			
	1 CH	2 CH	4 CH	8 CH
76.2	DC~3.76 K	DC~2.13 K	DC~1.14 K	DC~592
38.1	~1.88 K	~1.06 K	~571	~296
19.05	~941	~533	~285	~148
9.52	~470	~266	~142	~74
4.76	~235	~133	~71	~37
2.38	~117	~66	~35	~18
1.19	~58	~33	~17	~9

(2) To output signals at the output connector, use either analog or digital output, but not both at the same time. Otherwise there may be noise in the analog output.

(3) Recording/reproducing can be made only in the FWD mode. (It cannot be done in the REV mode.)

(4) To prevent aliasing, the input signal does not pass through any low-pass filters. Therefore, do not input a signal having components whose frequency is a half or more of each applied sampling frequency.

(5) Set ERASE to OFF for recording/reproducing at 76 cm/sec.
To erase a tape, pass the tape through a bulk-eraser or set the XR-5000/7000 data recorder in the REC/FWD mode and set REC to OFF and ERASE to ON.

(6) For installation of the AR-250PCMs, the ROM used in the XR-5000/7000 must be the G version or later. (The version of the ROM is displayed on the MISC display.)

(7) Protect the unit from shock. Store the unit in the supplied carton when it is not in use. (Store the replaced FM AMP units in the same manner.)

(8) Although the maximum recording level of the unit is ± 2 V, the level shown on the bar graph or the monitor meter is limited to about ± 1.5 V.

(9) Do not install a PCM AMP unit in the COMP channel (channel 14 for XR-5000 and channel 11 for XR-7000) whenever COMP is ON. Otherwise, the noise compensation for the FM AMP units will not work properly.

8. ADJUSTING THE AR-250PCM

If the XR-5000/7000 data recorder does not function properly when the AR-250PCMs are installed, perform the following adjustments depending on the problems you encounter.

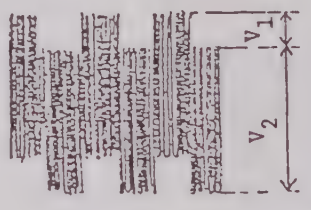
(1) If the unit does not operate normally or there are a lot of dropouts:
Change the channel on which the unit is installed to determine if the problem is only for a certain channel. (This may happen because the characteristics of the heads differ or because of noise in the power line.) In this case, select the channel which has better characteristics and install the unit on that channel. If this happens on all channels, adjust the bias current and the recording current.

(2) If accuracy is poor because of a large offset:
The settings of the potentiometers may have changed during transportation or handling. Adjust the input amplifier and the ADC.

(3) If the S/N ratio and crosstalk does not conform to the specifications:
If all other characteristics except for the S/N ratio and crosstalk conform to the specifications, adjust the input amplifier and then turn R903 little by little while measuring the S/N ratio and crosstalk to find a point which meets the specifications (Refer to the PCM AMP MAIN PCBA - ADJ LOCATIONS section.) Then measure the linearity and other characteristics to make sure that they are still within the specification.

8-1 Adjusting the bias and recording current

Remove the top cover of the XR-5000/7000. Using an oscilloscope, inspect the TP and GP signals at the checker terminals on the BIAS MIXER PCBA, corresponding to the PCM channel (for example, TP10 and GP10 for channel 10). Connect the TP to CH1 of the scope and the GP to CH2, then set the mode of the scope to ADD. (Set the ranges of the oscilloscope to 10 mV/div and 2μs/div, and use a 10-to-1 probe.)
Adjust R7XX on the BIAS MIXER PCBA while observing the oscilloscope so that V2 on the scope is 40 mV. (XX is the PCM CH number, for example, R710 for channel 10.) Also, adjust R902 on the PCM AMP PCBA so that V1 on the scope is 10 mV.



8-2 Adjusting the input amplifier

Attach the input connector and connect a standard voltage generator. (Set the number of multiplex channels to 1.) Set the input voltage at 0 V and measure the voltage at TP1. If it is within 0 $\pm$1 mV, there is no problem. If not, adjust R906 so that the voltage is within 0 $\pm$1 mV. Next, set the input voltage at +1 V then -1 V. The corresponding at TP1 must be +1 V $\pm$1 mV then -1V $\pm$1 mV. If not, adjust R905 so that the voltages is within the specifications.

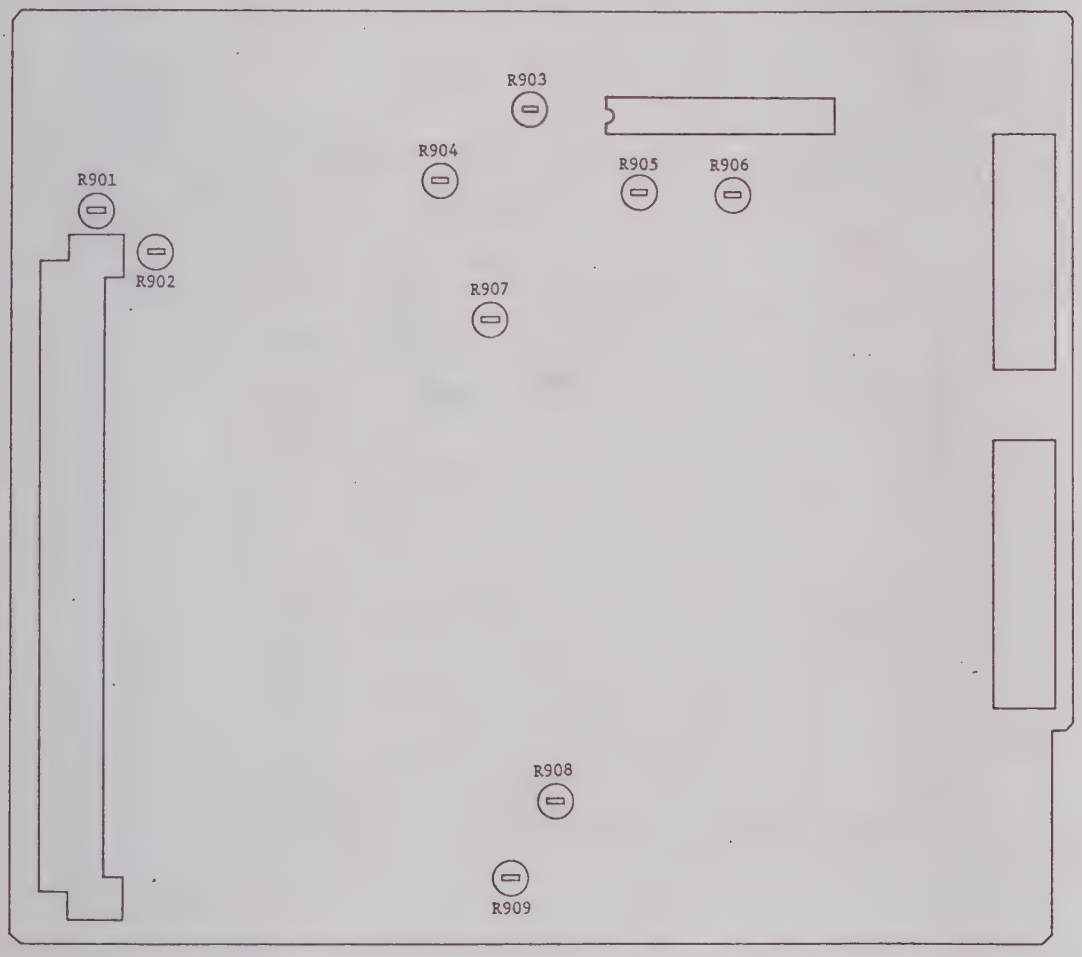
8-3 Adjusting the ADC (A/D converter)

Set the input voltage to 0 V and measure the output voltage on CH1. Adjust R903 so that the voltage is 0 $\pm$3 mV. Next, set the input voltage at +1 V then -1 V. Adjust R904 so that the corresponding voltage on CH1 is +1 V $\pm$3 mV then -1 V $\pm$3 mV.
Change the tape speed from 76 cm/sec to 1.2 cm/sec and check that the output voltage corresponding to each input voltage is within the specifications at each tape speed.

Then set the input voltage to 0 V and measure the S/N ratio with an AC meter (ex. HP3400A or a similar one). Adjust R903 finely so that the S/N ratio is 60 dB or higher at each tape speed from 76 cm/sec through to 1.2 cm/sec, or 55 dB when 4 Vp-p is set as a reference, read directly from an HP3400A. (When recording/reproducing at a tape speed of 76 cm/sec, set ERASE to OFF. For recording, erase the recordings of the tape with a bulk-eraser prior to using the tape.) After the S/N adjustment is complete, measure the output voltages corresponding to each input voltage again and check that the voltages are within the specifications. If not, adjust R903 finely so that both the DC output and the S/N ratio conform to the specifications.

When all adjustments on the MPX 1CH MODE are complete, press the [Y/N] key for the MANUAL setting display. Move the cursor to the MPX [1] /1 using the [▼] and [▶] keys. Set it to MPX [8] /8 using the [SHIFT] and [▼] keys and then press the [SHIFT] and [Y/N] keys at the same time. Change the tape speed from 76 cm/sec to 1.2 cm/sec and check that the output voltages of channel 1 to channel 8, corresponding to 0 V, +1 V and -1 V inputs, are within ±10 mV, and then the S/N ratio is 60 dB or higher when the input voltage is set to 0 V. If not, adjust R903 finely and check again.

8-4 PCM AMP MAIN - ADJUSTMENT LOCATIONS -



R901: for power voltage adjustment of the ADC and the S/N ratio

R902: for recording current adjustment

R903: for ADC offset adjustment

R904: for ADC gain adjustment

R905: for input amplifier gain adjustment

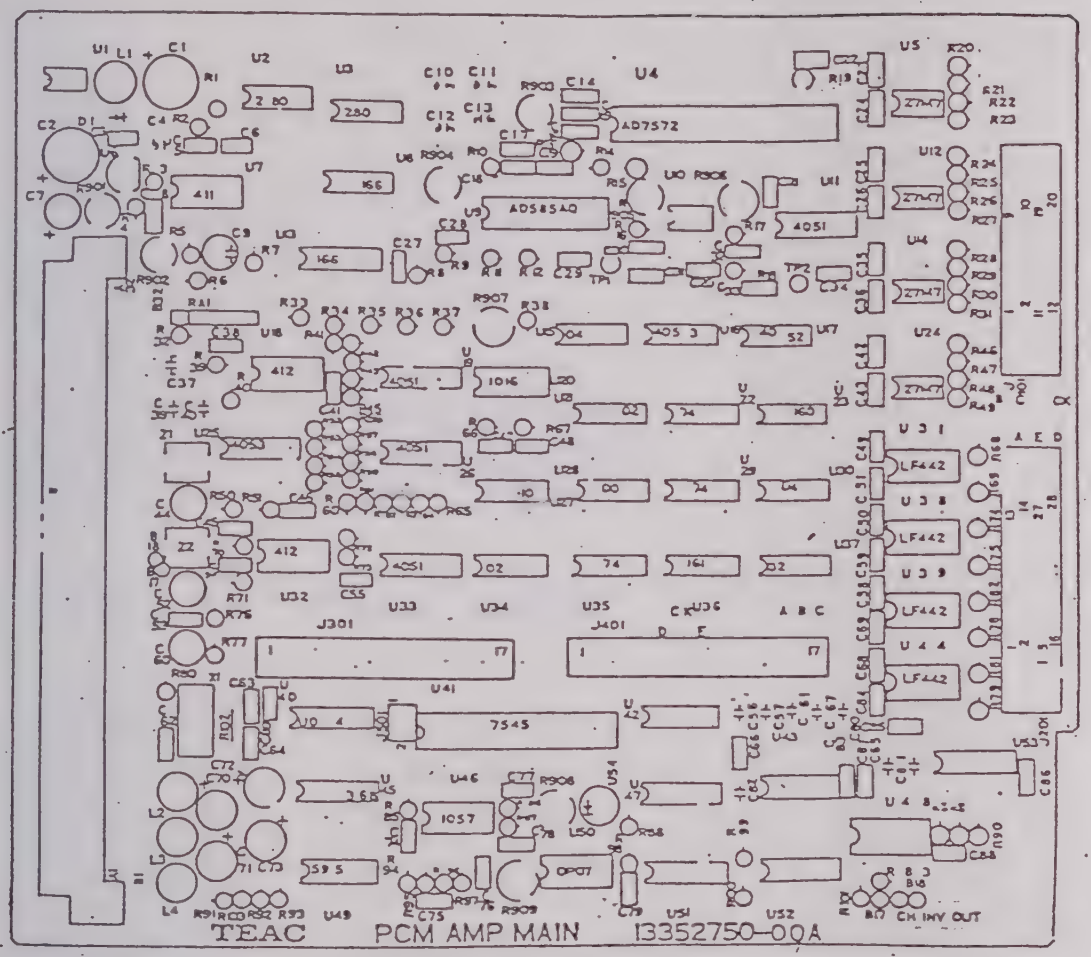
R906: for input amplifier offset adjustment

R907: for reference voltage adjustment of the comparator

R908: for DAC gain adjustment

R909: for DAC offset adjustment

8-5 PCM AMP MAIN PCBA AND PARTS LIST



Parts marked with an • require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARKS
	15552750-00	PCB ASS'Y		
		- Terminal, Checks -		
TP1, 2	13189150	MK-1095	2	
		- Connectors -		
J101	13123695	20P (FCN)	1	
J201	13123696	28P (FCN)	1	
P101	13123334	(00 8272 264 001 122)	1	
J301,401	13123691	17P (9097)	2	
J501	13123635	2P (IL-Y)	1	
		- IC's -		
U10	13447756	Linear, (TL071CPS)	1	
U14, 24	13447892	Linear, TLC27M7CPS	2	
U18, 32	13447373	Linear, (LF412CN)	2	
U31, 38, 39, 44, 48	13447900	LInear, LF442ACN	5	
U46	13447898	Linear, LT1057CN8	1	
U5, 12	13447892	Linear, TLC27M7CPS	2	
U50	13447903	Linear, OP07CP	1	
U7	13447367	Linear, (LF111CN)	1	
U1	13447673	Linear, (MAX637ACSA)	1	
U20	13447899	Linear, LT1016CN8	1	
U4	13443035	(AD7572KN12)	1	
U41	13443607	PM7545HP	1	
U54	13447901	Linear, AD589JH	1	
U6	13447902	Linear, LM337LZ	1	
U9	13443048	(AD585AQ)	1	
U11, 19, 26	13443502	MC74HC4051F	3	
U16, 25, 42	13443580	MC74HC4053F	3	
U17	13443492	MC74HC4052F	1	
U33, 43, 53	13443502	MC74HC4051F	3	

Parts marked with an • require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARKS
		- IC's -		
U47, 51, 52	13443502	MC74HC4053F	3	
U49	13443580	(MC74HC595F)	1	
U15, 30	13443586	MN74HC04S	2	
U21, 34, 37	13443585	MN74HC02S	3	
U22, 29, 35	13443591	MN74HC74S	3	
U23	13443594	MN74HC160S	1	
U27	13443589	MN74HC10S	1	
U28	13443584	MN74HC00S	1	
U36	13443595	MN74HC161S	1	
U45	13443598	MN74HC368S	1	
U2, 3	13443582	μ-PD74HC280G	2	
U40	13443587	MN74HCU04S	1	
U8, 13	13443581	μ-PD74HC166G	2	
		- Capacitors -		
C1, 2	12903720	CE 25V 100MF 20%	2	
C7	12903716	CE 25V 10MF 20%	1	
C70, 71, 72, 73	12902719	CE 25V 47MF 20%	4	
C37	12906230	CE 35V 3.3MF 20%	1	
C44, 52, 60	12906236	CE 50V 0.47MF 20%	3	
C9	12906223	CE 16V 10MF 20%	1	
C10, 11, 12, 13	12902570	CS 25V 10MF 20%	4	
C4	12902564	CS 25V 1MF 20%	1	

Parts marked with an • require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARKS
		- Capacitors -		
C56, 57, 80, 81, 82, 61, 65, 67	12904045	CQ .50V 0.022MF J	8	
C39, 40	12903988	CQ 50V 180PF 2%	2	
C22, 46	12900476	CC 100V 100PF 2%	2	
C27, 28, C75	12900475	CC 100V 82PF 2%	3	
C30	12900468	CC 100V 22PF 2%	1	
C53, 54, 89	12900466	CC 100V 15PF 2%	3	
C63, 64, 74	12900470	CC 100V 33PF 2%	3	
C8	12900456	CC 100V 2.2PF	1	
C14, 15, 16, 19, 20, 21, 23, 24, 24, 25, 26, 31, 32, 33, 34, 35, 36, 3, 5, 6, 29 38, 15,	12904260	CC 50V 0.1MF Z	48	
55, 41, 42, 43, 47, 47, 48, 49, 50, 51, 58, 59, 68, 69, 62, 66, 83, 76, 78, 79, 84, 85,				
86, 87, 88, 89				
		- Choke Coils -		
L1	14723568	330MH	1	
L2, 3, 4	14723477	100MH	3	

Parts marked with an • require longer delivery time.

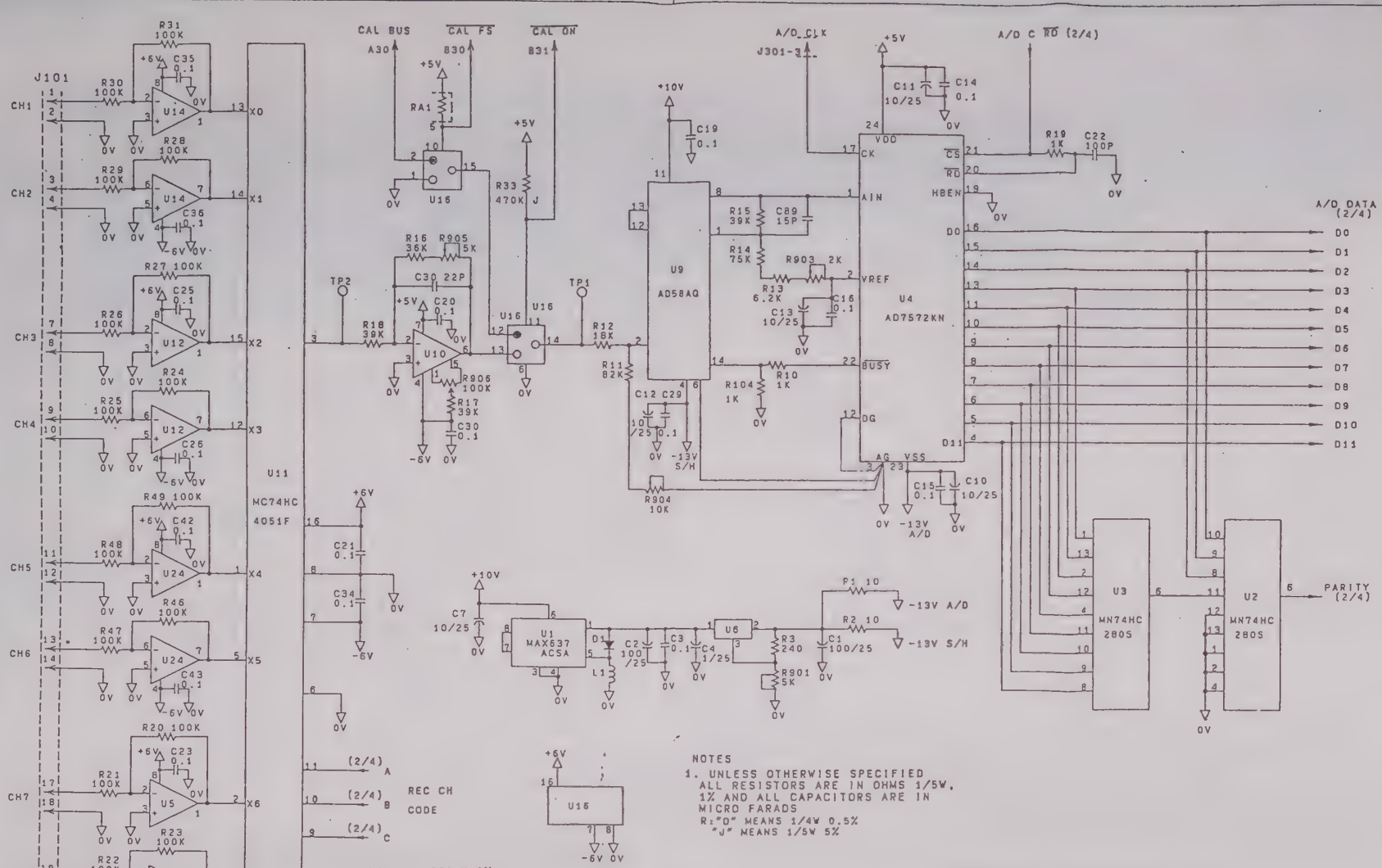
REF. NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARKS
		- Variable Resistors -		
R901, 905	13257339	.5K ohm 20%	2	
R902, 901	13257340	10K ohm 20%	2	
R903	13257338	2K ohm 20%	1	
R906	13257343	100K ohm 20%	1	
R907, 909	13257336	500K ohm 20%	2	
R908	13257337	1K ohm 20%	1	
		- Resistors -		
R83, 94	11078103	RN 1/4W 10K ohm 0.5%	2	
R84, 89, 90, 95, 96	11078203	RN 1/4W 20K ohm 0.5%	5	
R20-31, 46-49	11986920-00	RN 1/4W 100K ohm	16	
R1, 2	11070100	RN 1/5W 10 ohm 1%	2	
R11	11070823	RN 1/5W 82K ohm 1%	1	
R12, 45	11070183	RN 1/5W 18K ohm 1%	2	
R13	11070622	RN 1/5W 6.2K ohm 1%	1	
R14, 42	11070753	RN 1/5W 75K ohm 1%	2	
R15, 17, 18	11070393	RN 1/5W 39K ohm 1%	3	
R3	11070241	RN 1/5W 240K ohm 1%	1	
R32, 88	11070203	RN 1/5W 20K ohm 1%	2	
R34, 52, 66	11070224	RN 1/5W 220K ohm 1%	3	
R35, 57, 64	11070304	RN 1/5W 300K ohm 1%	3	
R37, 44, 54	11070472	RN 1/5W 4.7K ohm 1%	3	

Parts marked with an * require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARKS
		- Resistors -		
R38, 67, 87	11070123	RN 1/5W 12K ohm 1%	3	
R39	11070513	RN 1/5W 51K ohm 1%	1	
R4, 85	11070101	RN 1/5W 100 ohm 1%	2	
R40	11070782	RN 1/5W 6.8K ohm 1%	1	
R41, 50, 58, 72	11070222	RN 1/5W 2.2K ohm 1%	4	
R43, 55, 61	11070912	RN 1/5W 9.1K ohm 1%	3	
R5	11070822	RN 1/5W 8.2K ohm 1%	1	
R51	11070911	RN 1/5W 910 ohm 1%	1	
R53, 65	11070363	RN 1/5W 36K ohm 1%	2	
R56, 62	11070753	RN 1/5W 75K ohm 1%	2	
R59, 60	11070183	RN 1/5W 18K ohm 1%	2	
R63	11070154	RN 1/5W 150K ohm 1%	1	
R68, 69, 74, 75	11070750	RN 1/5W 75 ohm 1%	4	
R7, 16, 36	11070363	RN 1/5W 36K ohm 1%	3	
R70, 71, 76, 77	11070223	RN 1/5W 22K ohm 1%	4	
R73, 98	11070472	RN 1/5W 4.7K ohm 1%	2	
R78, 79, 81, 82	11070750	RN 1/5W 75 ohm 1%	4	
R8, 9, 19	11070102	RN 1/5W 1.0K ohm 1%	3	
R86	11070752	RN 1/5W 7.5K ohm 1%	1	
R87	11070620	RN 1/5W 62K ohm 1%	1	
R88, 89	11070101	RN 1/5W 100 ohm 1%	2	
R97, 10, 104	11070512	RN 1/5W 5.1K ohm 1%	3	
R6, 33, 80, 91, 103	11190474	RD 1/5W 470K ohm 5%	5	
R92, 93	11190224	RD 1/5W 220K ohm 5%	2	

Parts marked with an * require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARKS
		- Resistors -		
R102	11188685	RD 1/3W 6.8M ohm 5%	1	
		- Array resistors -		
RA1	13497776	4-element 470K ohm 5%	1	
		- Diode -		
D1	13411382	Switching, diode (1SS131)	1	
		- Oscillator -		
X1	13295203	Crystal, oscillator 10.2MHz	1	
		- Traps -		
Z1	13494043-00	Bias trap (800KHz)	1	
Z2	14723512-00	Coil, bias trap 2.4MHz	1	

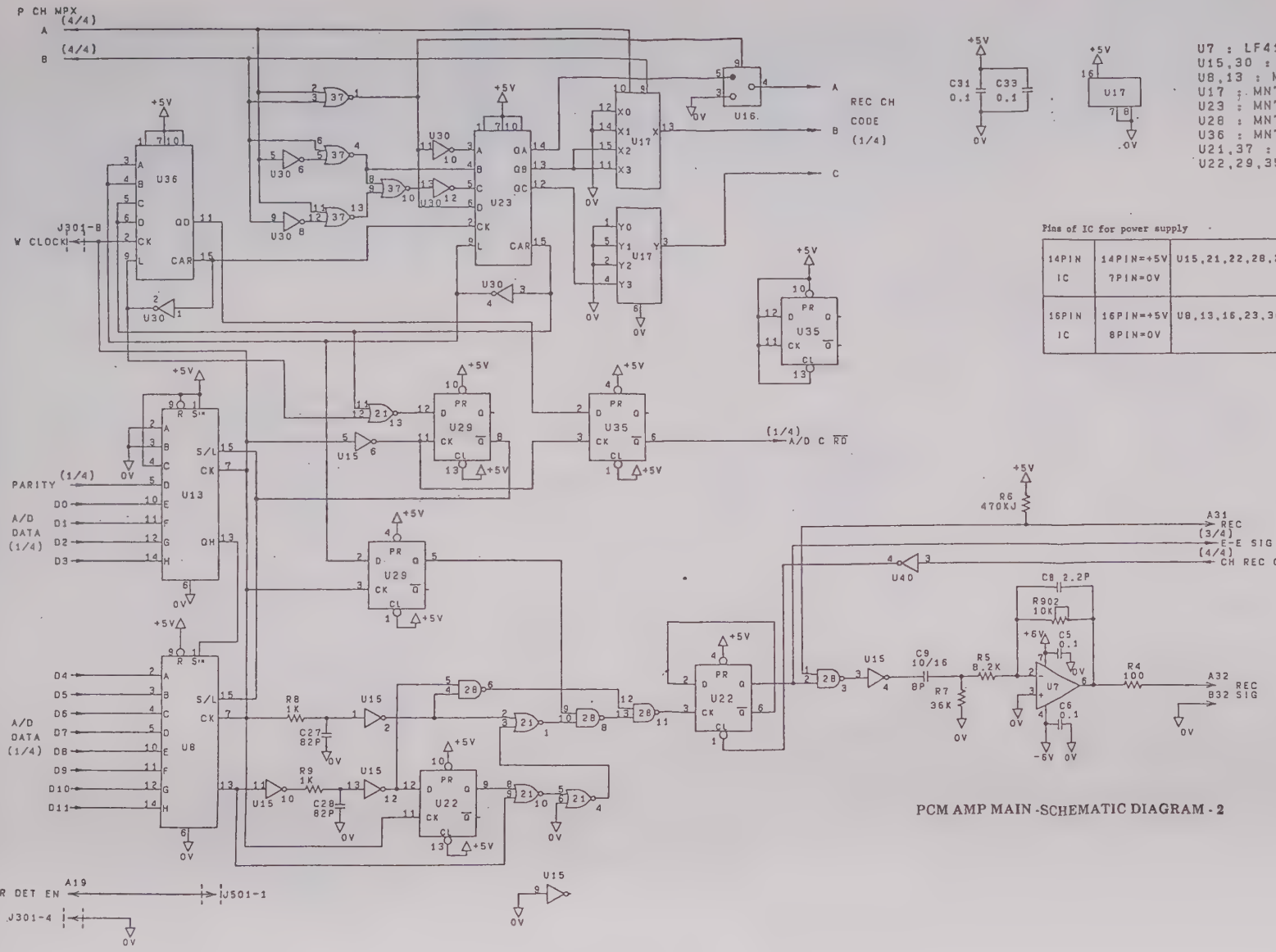


NOTES
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE IN OHMS 1/5W, 1% AND ALL CAPACITORS ARE IN MICRO FARADS
R: "D" MEANS 1/4W 0.5%
"J" MEANS 1/5W 5%

L1 : 330μH 5%
D1 : 1SS131
U5,12,14,24 : TLC27M7CPS
U10 : TL071CPS
U6 : LM337LZ
U16 : MC74HC4053F

(R20-21,R22-23,R24-25,R26-27 R28-29,R30-31,R46-47,R48-49) 100K ±1% ±50ppm/°C
The relative error of a pair of resistors is 0.1%.

8-6 PCM AMP MAIN -SCHEMATIC DIAGRAM - 1

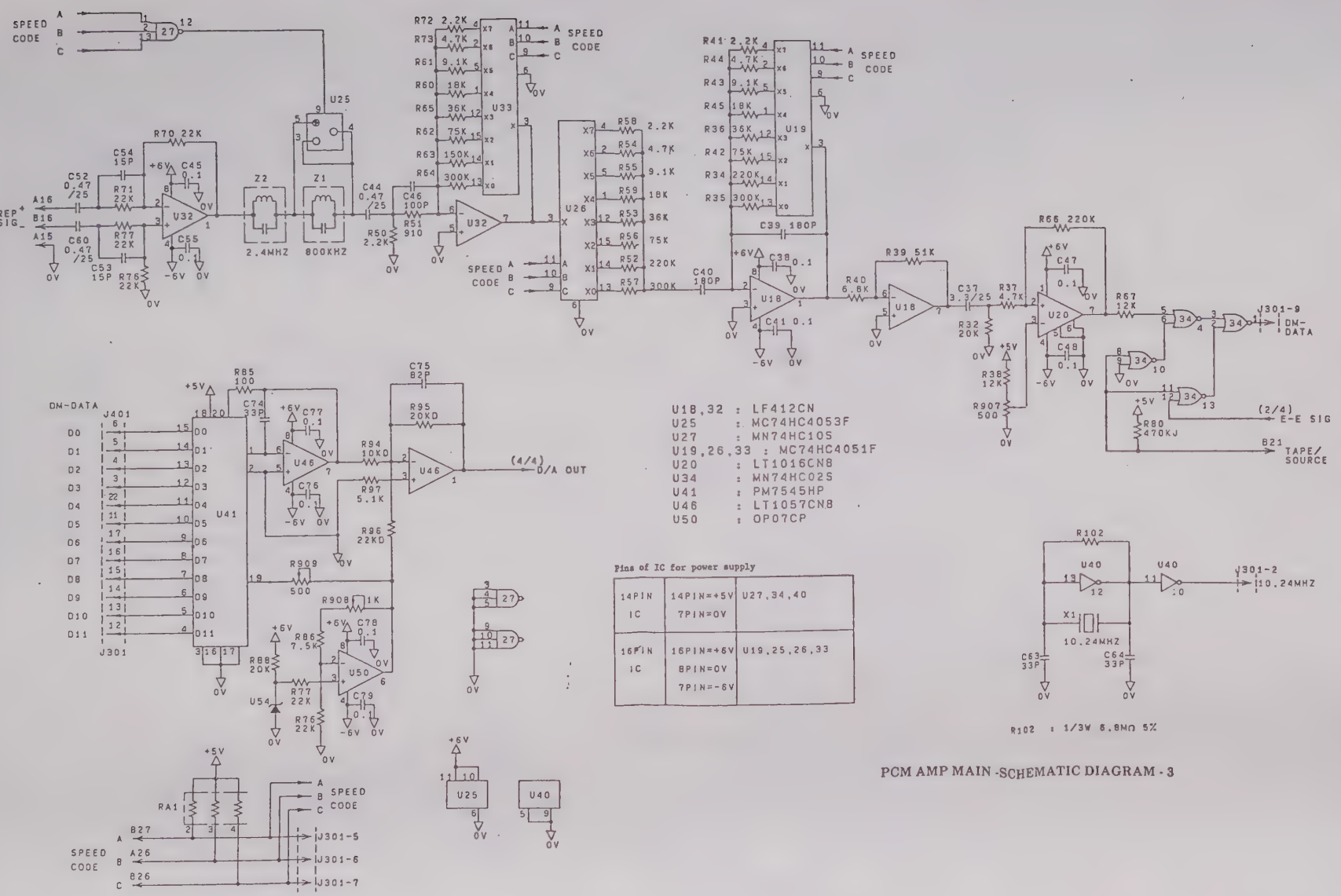


U7 : LF411CN
U15,30 : MN74HC04S
U8,13 : MN74HC166S
U17 : MN74HC4052S
U23 : MN74HC160S
U28 : MN74HC00S
U36 : MN74HC161S
U21,37 : MN74HC02S
U22,29,35 : MN74HC74S

Pins of IC for power supply

14PIN IC	14PIN=+5V 7PIN=0V	U15,21,22,28,29,30,35,37
16PIN IC	16PIN=+5V 8PIN=0V	U8,13,16,23,36

PCM AMP MAIN -SCHEMATIC DIAGRAM - 2



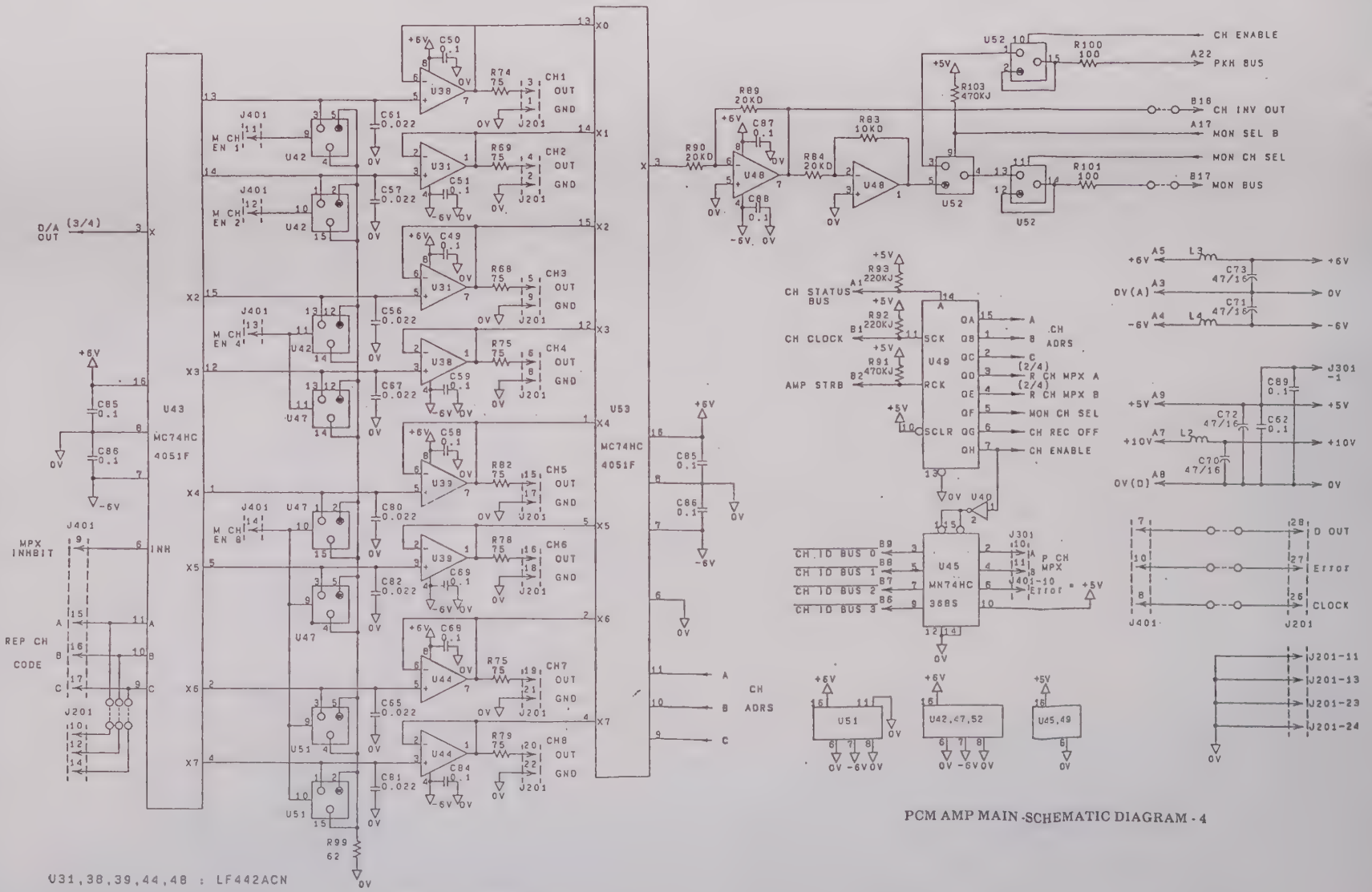
U18,32 : LF412CN
U25 : MC74HC4053F
U27 : MN74HC10S
U19,26,33 : MC74HC4051F
U20 : LT1016CN8
U34 : MN74HC02S
U41 : PM7545HP
U46 : LT1057CN8
U50 : OP07CP

Pins of IC for power supply

14PIN IC	14PIN=+5V 7PIN=0V	U27,34,40
16PIN IC	16PIN=+6V 8PIN=0V 7PIN=-6V	U19,25,26,33

R102 : 1/3W 6.8MΩ 5%

PCM AMP MAIN -SCHEMATIC DIAGRAM - 3



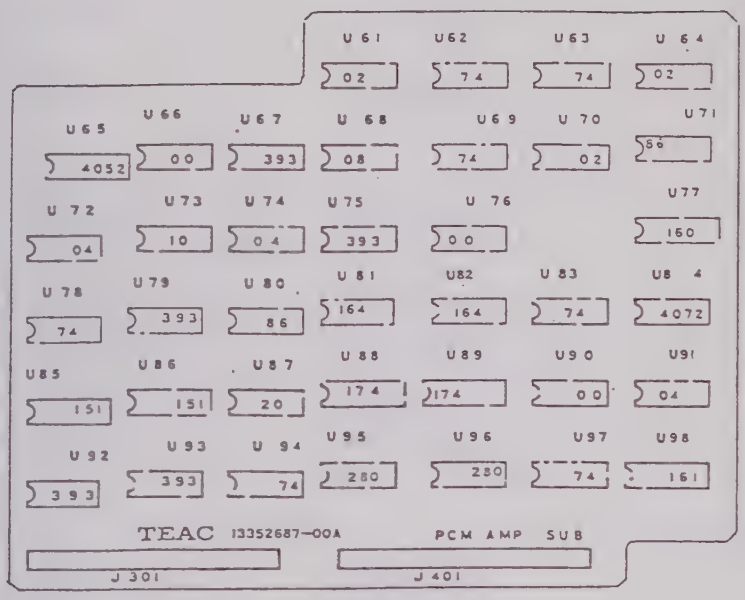
PCM AMP MAIN -SCHEMATIC DIAGRAM - 4

U31,38,39,44,48 : LF442ACN
U42,47,51,52 : MC74HC4053F
U49 : MC74HC595F

L2~4 : 100μH 5%

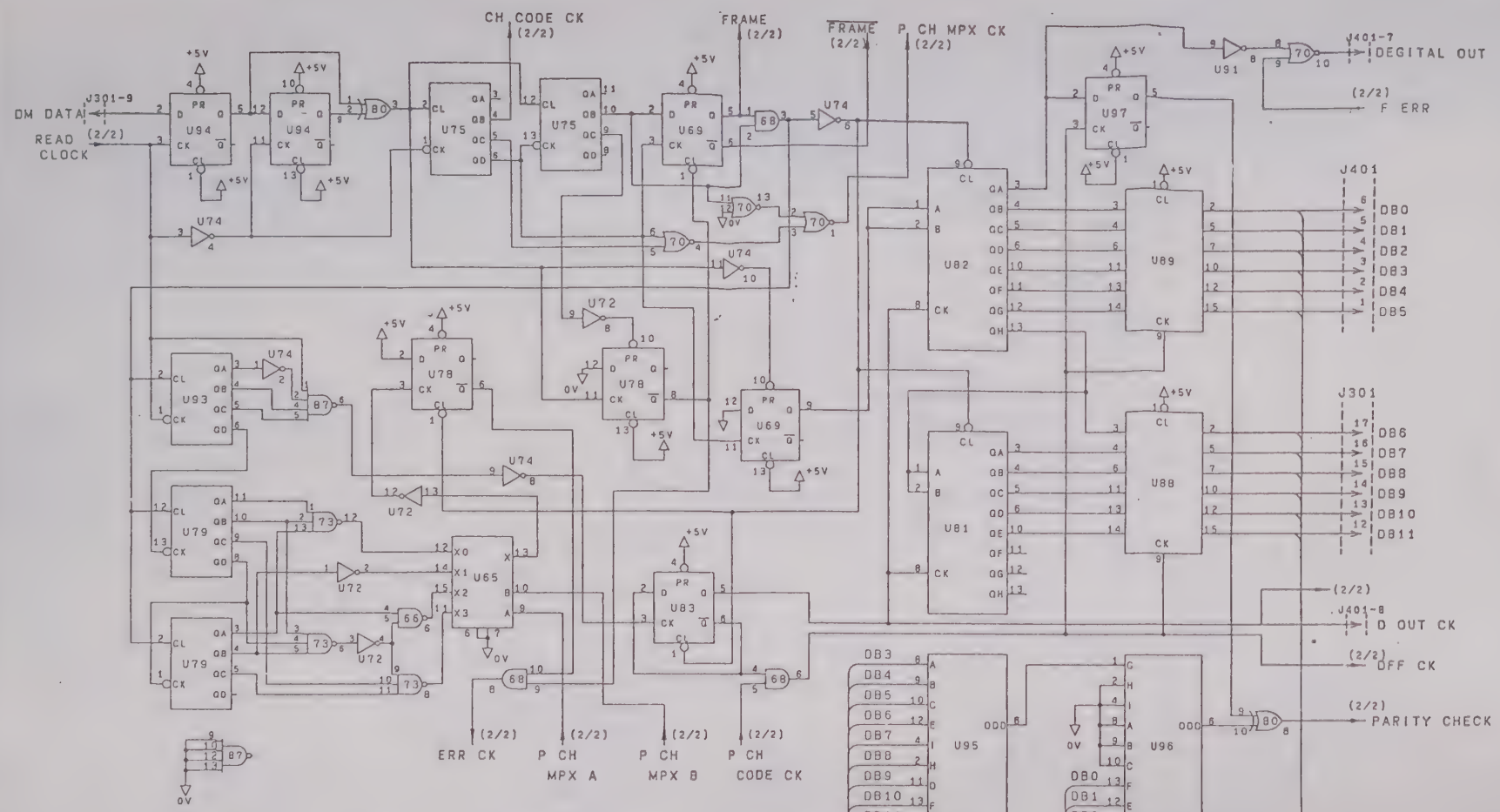
O---O = Jumper

8-7 PCM AMP SUB PCBA AND PARTS LIST

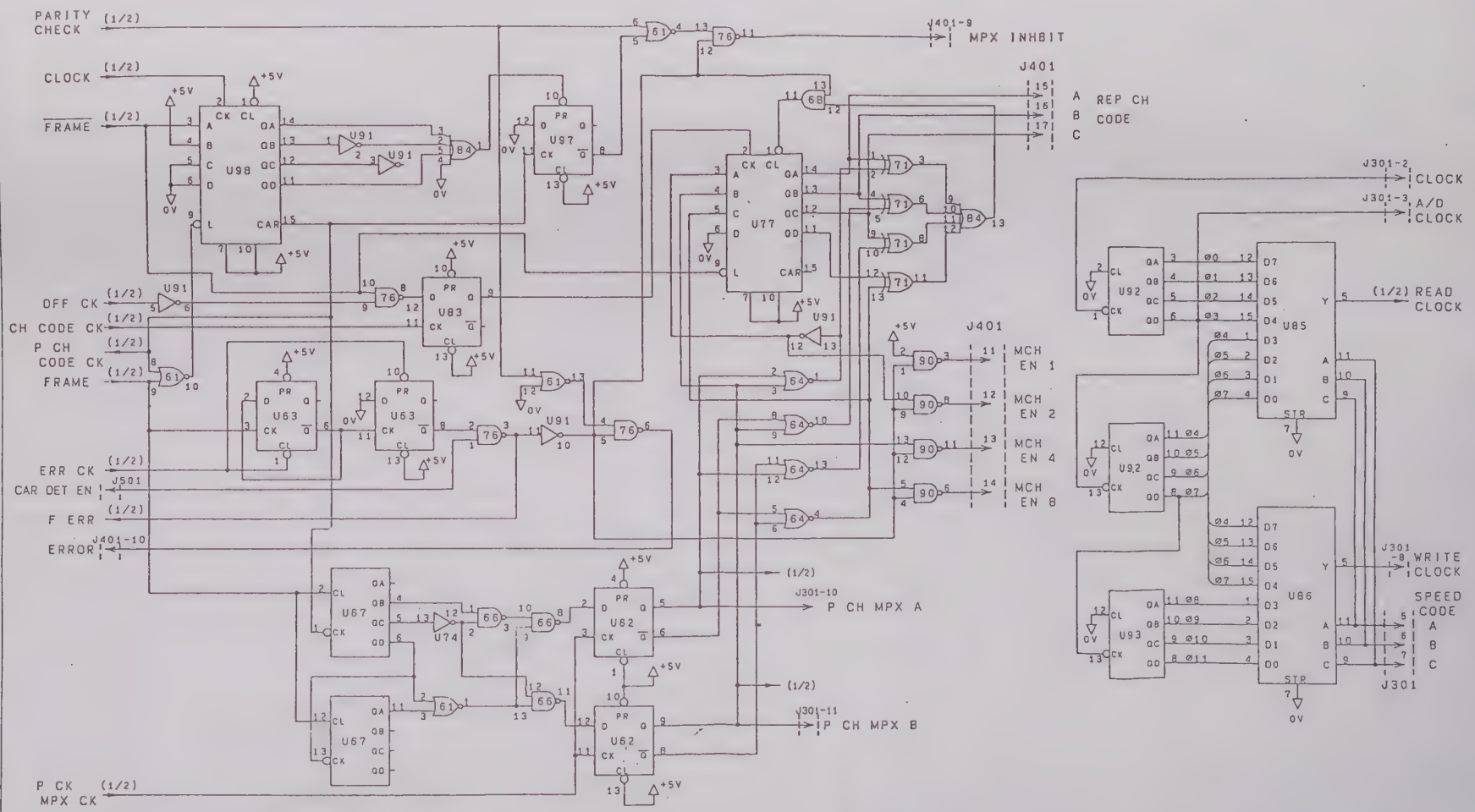


Parts marked with an * require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	Q'TY	REMARKS
	15552687-00	PCB ASS'Y		
		- IC's -		
U66, 76, 90	13443584	MN74HC00S	3	
U61, 64, 70	13443585	MN74HC02S	3	
U72, 74, 91	13443586	MN74HC04S	3	
U68	13443588	MN74HC08S	1	
U73	13443589	MN74HC10S	1	
U87	13443590	MN74HZ20S	1	
U62, 63, 69, 78, 83, 94, 97	13443591	MN74HZ74S	7	
U71, 80	13443592	MN74HC86S	1	
U85, 86	13443593	MN74HZ151S	2	
U77	13443594	MN74HC160S	1	
U98	13443595	MN74HC161S	1	
U81, 82	13443596	MN74HC164S	2	
U88, 89	13443597	MN74HC174S	2	
U67, 75, 79,92,93	13443599	MN74HC393S	5	
U65	13443600	MN74HC4052S	1	
U95, 96	13443582	μ-PD74HC280G	2	
U84	13443583	μ-PD4072BG	1	
		- Capacitors -		
C101-108	12906369	CC 50V 10000PF	8	



8-8 PCM AMP SUB - SCHEMATIC DIAGRAM - 1



U61,64 -- MN74HC02S
U62,63 -- MN74HC74S
U66,76,90---MN74HC00S
U67,83,97---MN74HC74S
U71 --- MN74HC86S
U77 --- MN74HC160S
U85,86 -- MN74HC151S
U91 --- MN74HC04S
U92 --- MN74HC393S
U98 --- MN74HC161S
U84 -- μPD4072G

Pins of IC for power supply

14PIN IC	14PIN=+5V 7PIN=0V	U61,62,63,64,66,67,68,69 U70,71,72,73,74,75,76,78 U79,80,81,82,83,84,87,90 U91,92,93,94,95,96,97
16PIN IC	16PIN=+5V 8PIN=0V	U65,77,85,86,88,89,98

PCM AMP SUB - SCHEMATIC DIAGRAM - 2

PARTS ORDERING INFORMATIONS

When ordering parts, always include the following information:

1. MODEL
2. UNIT SERIAL NO.
3. DESCRIPTION
4. REF. NO.

NOTICE REGARDING PARTS ORDERS

1. In some instances, indivisual minor parts are not available.
   In this case, the entire assembly, including the part requested, will be sent to you.
2. Do not order by only REF. No. or Description.
3. Parts marked with an * require longer delivery time, about two to three months.

NOTE:

- CAPACITORS -

CC = Ceramic, Magntic capacitor.
CS = Tantalum.
CQ = Metallized film capacitor,
Film capacitor,
Metallized Polypropylene film.
CE = Aluminium electrolytic capacitor.

- RESISTORS -

RD = Carbon.
RN = Metal film.
VR = Variable resistor.